



Certificate no.:
TAA00003SS

TYPE APPROVAL CERTIFICATE

This is to certify:

that the **Cargo Monitoring and Control System**

with type designation(s)
TBF1800 / TBL1800M

issued to

Air Liquide Advanced Technologies SA
Sassenage, France

is found to comply with

DNV GL rules for classification – Ships Pt.6 Ch.5 Sec.21 Cyber security

Application:

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV. This type approval covers security capabilities for DNV Cyber security profile level 1 (SP1) and IACS UR E27, subject to conditions stated in this certificate.

Issued at **Høvik** on **2026-04-09**

This Certificate is valid until **2028-04-08**.

for **DNV**

DNV local unit: **Netherlands VMC**

Approval Engineer: **Simen Sandelien**

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid. The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.

LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder of this document, or following from mandatory law, the liability of DNV AS, its parent companies and their subsidiaries as well as their officers, directors and employees ("DNV") arising from or in connection with the services rendered for the purpose of the issuance of this document or reliance thereon, whether in contract or in tort (including negligence), shall be limited to direct losses and under any circumstance be limited to USD 300 000.

Product description

The TBF1800/TBL1800M system is a cargo control and monitoring system for LNG/NG. The system is a complete Subcooler/Liquefier Turbo-Brayton System (Mechanical Skid + Electrical Cabinet + Transfo). The TBF/TBLM, is an equipment able to subcool LNG/liquefy NG through a heat exchanger. The technology is based on a reverse Brayton cycle: an inert refrigerant gas in close loop is compressed, then cooled and finally expanded thanks to a rotating expander. The cold power generated is used to subcool LNG or direct liquefy NG via a heat exchanger.

Onboard components:

Component Description	Type Designation	OS SW Version	Application SW Version
HMI		Microsoft Windows® 10 IoT Enterprise 2019 LTSC	SIMATIC WinCC V7.4 SP1, Runtime
PLC	Siemens S7-1513	-	TIA Portal V.18. update 3
Gateway	EWON Flexy 205	Firmware v.15	Ebuddy Won V1.X.tar
Switch	Siemens Scalance	X216	TIA Portal V.18. update 3

Approval conditions

Each type approved system intended for DNV classed vessels shall be delivered with a vessel-specific Product certificate (PC). The Product certificate shall confirm compliance with applicable DNV rules for the project and shall be issued based on approval of design documents and certification survey with testing as specified in DNV-RU-SHIP Pt.4 Ch.9.

For newbuilding projects, design documents for identical deliveries to sister vessels with the same DNV project ID shall be submitted for approval in one common document transmittal.

When the type approved system is delivered to a vessel with class notation Cyber secure (Essential), the following additional verification applies as per DNV-RU-SHIP Pt.6 Ch.5 Sec.21:

1. F030 System topology
2. F071 Inventory list
3. F262 Test report or declaration of hardening and security configuration.

If a delivered system differs from the type approved system, the differences shall be described and submitted for assessment. See required information in DNV-RU-SHIP Pt.6 Ch.5 Sec.21 [1.8.2].

Application/Limitation

1. The Ewon Flexy Gateway shall be on a dedicated subnet of the vessel firewall without any other systems on that subnet
2. The vessel Firewall shall not allow inbound traffic to the Ewon Flexy Gateway subnet.
3. The system does not have a capability to alert audit failure events. The CSMS needs to ensure that audit failure events are checked manually at a scheduled periodic interval, no less than once a month.

Type Approval documentation

DNV No	Drawing No	Revision	Title
30	C6007-PO-211	3	System installation & configuration
22	C6007-QA-011	2	Compliance Cyber - Network
18	C6007-QA-012	2	Compliance Cyber - Antivirus-Antimalware-Firewall
3	C6007-QA-013	1	Compliance Cyber - Backup - Restore procedure plan
23	C6007-QA-014	4	Compliance Cyber - Account Management Procedure
5	C6007-QA-015	2	Compliance Cyber - Administration Guide USB
7	C6007-QA-016	1	Compliance Cyber - Product Map and Physical Access
8	C6007-QA-017	1	Compliance Cyber - Monitoring
24	C6007-QA-018	2	Compliance Cyber - LOG
25	C6007-QA-019	2	Compliance Cyber - Lifecycle management
11	C6007-QA-020	1	Compliance Cyber - System Plan
12	C6007-QA-021	1	Compliance Cyber - Incident Response Plan
13	C6007-QA-022	1	Compliance Cyber - Softwares Certificates
26	C6007-QA-023	2	Compliance Cyber - Electrical cabinets Bill of material
27	C6007-QA-024	4	Compliance Cyber - Validation Procedures

28	C6007-QA-025	3	Compliance Cyber - System Design
17	C6007-QA-026	1	Compliance Cyber - Risk Analysis
29	C6007-QA-027	4	Compliance Cyber – Telemetry
31	D5900-OP-251	2	Electrical cabinets routine test procedure
21	D5900-TR-251	4	Electrical cabinets routine test report
32	C6375-QA-024	1	Cyber type test report

Tests carried out

Tested in accordance with requirements for Pt.6 Ch. 5 Sec 21 for Cyber Secure (SP1) – July 2024 edition

Marking of product

The components in the type approved systems are marked/identified in accordance with name, model and version as listed in documents C6007-QA-023 (Electrical cabinets Bill of material).

Periodical assessment

A renewal assessment will be performed at renewal of the certificate.

The scope of the renewal assessment is to verify that the conditions stipulated for the type are complied with, and that no alterations are made to the product design or choice of systems, software versions, components and/or materials.

The main elements of the assessment are:

- Ensure that type approved documentation is available
- Inspection of factory samples, selected at random from the production line (where practicable)
- Review of production and inspection routines, including test records from product sample tests and control routines
- Ensuring that systems, software versions, components and/or materials used comply with type approved documents and/or referenced system, software, component and material specifications
- Review of possible changes in design of systems, software versions, components, materials and/or performance, and make sure that such changes do not affect the type approval given
- Ensuring traceability between manufacturer's product type marking and the type approval certificate
- Review documented evidence of adherence to Secure Development Lifecycle processes

Manufactured by:

Air Liquide Advanced Technologies SA

END OF CERTIFICATE